

## **REMARKS**

In the Office Action mailed July 29, 2008, the Examiner rejected claims 1-10 and 18-23 under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. No. 4,072,607 to Schiller, et al (Schiller). Claims 11-17, 24, and 25 were rejected under 35 U.S.C. 103(a) as being unpatentable over Schiller in view of U.S. Pat. No. 6,222,083 to Colle et al. (Colle). Claims 1-25 were rejected under 35 U.S.C. 103(a) as being unpatentable over Colle in view of Schiller. The Examiner also objected to the form of claims 2, 7, and 19. Applicants herein present amendments and responses in light of the office action and the prior art. Applicants respectfully request reconsideration and an allowance of currently pending claims 21-23 and 26-57.

## **Claim Amendments**

Applicants' claim amendments are fully supported by the specification and serve to more clearly claim the subject matter of the application. In particular, new independent claim 26 is one of the particular embodiments of the invention disclosed in paragraphs [0038] – [0039] of the application. The new dependent claims 27-33 are supported by the language of cancelled claims 3-9, new dependent claims 34-36 are supported by the language of cancelled claims 12-14, and new dependent claims 37-39 are supported by the language of cancelled claims 18-20. Additionally, new independent claims 40-43 are an alternative embodiment of the invention, which is disclosed in paragraphs [0041] – [0042]. New dependent claims 44-50 are supported by the language of cancelled claims 3-9, new dependent claim 51 is supported by paragraph [0042], new dependent claims 52-54 are supported by the language of cancelled claims 15-17, and new dependent claims 55-57 are supported by the language of cancelled claims 18-20.

## **Claim Objections**

The claim objections are moot in light of Applicants' claim amendments.

## **Claim Interpretation**

The claim interpretations are moot in light of Applicants' claim amendments.

## **Rejection of Claims 1-10 and 18-23 under 35 U.S.C. § 102**

The Examiner rejected claims 1-10 and 18-23 under 35 U.S.C. § 102(b) as being anticipated by Schiller. Applicants believe this rejection is moot with respect to cancelled claims 1-10 and 18-20. However, with respect to claims 21-23, Applicants respectfully traverse the rejection because the prior art fails to teach or suggest each element of the claims. As amended, claim 21 specifically requires, among other things, "contacting the fluid with an effective amount of *a clathrate hydrate inhibitor...*" As noted in the application, a clathrate hydrate inhibitor means preventing the formation of clathrate hydrates. App., para. [0017]. "Clathrate hydrates" are "water crystals which form a cage-like structure around 'guest' molecules such as hydrate-forming hydrocarbons or other gases." App., para. [0003]. Schiller does not relate to "hydrate inhibitors" and fails to teach or suggest such a limitation. Instead, Schiller relates to inhibition of scale formation and/or anti-precipitation. *See*, Schiller, Abstract. In Schiller, scale inhibitor means "a composition which inhibits the deposition of adherent scale deposits (e.g., alkaline earth metals such as magnesium and calcium) on the surfaces or parts of metal heat exchange surfaces. *See*, Schiller, col. 1, ll. 35-37 and 63-66. The term "anti-precipitant" in Schiller means "a composition which hinders the precipitation of a solid or the formation of turbidity in bulk solutions." *See*, Schiller, col. 1, ll. 66-68. Note that the problem of scale formation is generally only encountered in "liquid flow applications." *See*, Schiller, col. 1, l. 15. Schiller does not disclose or suggest, implicitly or inherently, a clathrate hydrate inhibitor. For at least these reasons, it is believed that claim 21 is patentable over Schiller and an allowance of claim 21 is earnestly solicited. Additionally, claims 22-23 are limited to methods of preparing a *hydrate inhibitor*, so are believed to be patentable over Schiller for similar reasons, and allowance of at least claims 21-23 is earnestly solicited.

**Obviousness Rejections under 35 U.S.C. § 103**

The Examiner rejected claims 11-17, 24, and 25 under 35 U.S.C. § 103(a) as being unpatentable over Schiller as applied to claims 1-10 and 18-23 in view of Colle. Because each of the rejected claims have been cancelled, Applicants believe that the amendments make the claim rejection moot.

The Examiner rejected claims 1-25 as being under 35 U.S.C. § 103(a) as being unpatentable over Colle in view of Schiller. The examiner noted that the motivation to combine is “provided by the teaching of Schiller that the molecular weight distribution as such resulted in a synergistically better scale and precipitate inhibition.” Applicants traverse the rejection with respect to claims 21-23 for at least the following reasons. First, Colle teaches away from using the polymers taught by Schiller. Second, Schiller deals with inhibiting scale deposits and preventing precipitation, so is not combinable with Colle, which deals with hydrate inhibition. Third, there is no motivation to combine these references. For at least these reasons, Applicants believe that claims 21-23 are patentable over the prior art and respectfully request allowance of these claims.

First, Colle teaches away from using the polymers taught by Schiller. Specifically, Schiller teaches the use of an acrylamide monomer, which is known to be comprised of an NH<sub>2</sub> group. *See*, Schiller, Example 1. Schiller also specifically teaches the combination of low and high molecular weight polymers from U.S. Pat. No. 3,463,730, which specifically discloses a polymer structure having a monomer with an NH<sub>2</sub> group at column 3, lines 30-50. *See*, Schiller, Example 4. Colle teaches away from using polymers having NH<sub>2</sub> groups because they are not effective hydrate inhibitors. Specifically, Colle provides an inhibitor description showing a generic acrylamide structure with the N having an R<sub>1</sub> branch and an R<sub>2</sub> branch, “where R<sub>1</sub> is a hydrocarbon group...and R<sub>2</sub> is a hydrogen atom or a hydrocarbon group...” Colle, col. 5, ll. 11-34. In other words, R<sub>1</sub> and R<sub>2</sub> cannot both be hydrogen, therefore no NH<sub>2</sub> group can be formed. Colle further states that N-substituted acrylamide copolymers are also effective hydrate inhibitors and have a generic structure as above wherein “the first monomer may have R<sub>1</sub> and R<sub>2</sub> in any combination of hydrogen, methyl, and ethyl groups provided R<sub>1</sub> and R<sub>2</sub> are not both hydrogen and the second monomer will have R<sub>3</sub>=hydrogen, while R<sub>4</sub> may be C<sub>3</sub>-C<sub>10</sub> alkyl

group..." *Id.* at col. 6, ll. 8-12. For good measure, Colle tests the NH<sub>2</sub> group (e.g. PAM or polyacrylamide) with other hydrate inhibitors and shows that the performance is no better than the case having no inhibitor. *Id.* at Table 1.

Second, Colle and Schiller deal with different applications of different polymers in different processes. As noted above, Schiller is attempting to inhibit or reduce the deposition of scale on surfaces. Colle deals instead with inhibiting the formation of clathrates or gas hydrates. These two areas are not only different, they are unrelated and a person of ordinary skill in the art would not combine the teachings of Schiller and Colle.

Third, there is no motivation to combine these references. The synergistic effect of Schiller is the result of combining a low molecular weight scale inhibitor and a higher molecular weight anti-precipitant, so it combines two known functions into one polymer. Colle only deals with one function, hydrate inhibition. So, there is no first and second function to combine to achieve the synergy disclosed in Schiller. In addition, the application shows a "surprising result" that the hydrate inhibition performance of the bimodal polymer is better than the weight average prediction based upon its two components. Application, paragraph [0067]. Nothing in Schiller suggests that the hydrate inhibitors of Colle would show any synergy if made as a bimodal polymer. For at least these reasons, claims 21-23 are patentable over Colle in view of Schiller and allowance of these claims is earnestly solicited.

### **The Prior Art Does Not Teach the Limitations of the New Claims**

New claims 26-56 generally relate to bimodal hydrate inhibitors, like original claims 1-25. However, they more clearly and particularly claim the polymers of interest and Applicants believe that they are patentable over the prior art. First, claim 26 requires, among other things, an "N-vinyl lactam" polymer. No such polymer is disclosed by Schiller or Colle. For at least this reason, claim 26 is patentable over each of Colle and Schiller, and any combination thereof. Claims 27-39 depend from claim 26 and are therefore patentable over Colle and Schiller for at least the same reason. As such, Applicants respectfully request allowance of new claims 26-39 over the prior art. Second, claims 40-57 relate to a second, alternative group of polymers. The claimed bimodal polymers of claims 40-57 specifically exclude NH<sub>2</sub> acrylamides, as disclosed

by Schiller. Further, the teachings of Colle away from the teachings of Schiller are applicable to the polymers of claims 40-57. Applicants believe that the polymers of claims 40-57 are patentable over the prior art for at least the reasons given above. Applicants respectfully request allowance of all pending claims 21-23, and 26-57.

### **CONCLUSION**

In view of the amendments and remarks set forth above, Applicants respectfully request allowance of all pending claims 21-23 and 26-57, removal of the objections to the claims, and issuance of a notice of allowance of all pending claims. Payment for the additional claims has been made by a separate, attached sheet. No other fees are believed to be due at this time, however, the Commissioner is hereby authorized to charge the Deposit Account No. 05-1328 for any additional fees associated with this application. Further, if the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: October 29, 2008

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